Alireza Habibzadeh

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Education

Sharif University of Technology — Tehran, Iran
B.Sc. in Computer Engineering, GPA: 18.63/20 — September 2020–July 2025
B.Sc. in Physics (double major), GPA: 18.83/20 — (Expected)
CGPA: 18.55/20 [Transcript]

Young Scholars Club — Tehran, Iran
Preparation Course for the International Physics Olympiad — 2019–2020

Allame Helli High school — Tehran, Iran
Diploma in Mathematics and Physics, GPA: 19.66/20 — 2017–2020

Experience

Swiss Federal Institute of Technology Lausanne (EPFL) — Lausanne, Switzerland
Research intern under the supervision of Prof. Tobias J. Kippenberg at Laboratory of Photonics and Quantum Measurements (LPQM). — July 2023–October 2023
Developed an automatic qubit characterization system. [Certificate]

Mobile Communication Company of Iran (MCI) — Tehran, Iran
After a series of training sessions and exciting visits to different facilities, we performed data analysis on a huge financial database. [Certificate] — November 2022–June 2023

Teaching Experience

- **Computer Simulation** (Head TA) — Fall 2024 (Current)
  Prof. Afshin Hemmatyar, Sharif University of Technology Kish Campus
- **Programming for Data Analysis** (TA) — Summer 2024
  Prof. Amir Mahdi Sadeghzadeh, Sharif University of Technology
  Designed and graded coding exercises to help students get familiar with `pandas` and `scipy`.
- **Numerical Computation** (TA) — Spring 2024
  Dr. Samira Hossein Ghorban, Sharif University of Technology
  Designed and graded coding exercises on numerical methods for solving differential equations, specifically an altered version of the Lotka-Volterra (predator-prey) equations. [Repository]
- **Linear Algebra** (TA) — Spring 2023
  Dr. Samira Hossein Ghorban, Sharif University of Technology
  Helped in grading the assignments.
- **Engineering Probability and Statistics** (TA) — Fall 2022
  Prof. Ali Sharifi-Zarchi, Sharif University of Technology
  Designed and graded a data analysis assignment on R programming language. [Repository]
- **Intro Programming (C)** (TA) — Fall 2022
  Prof. MohammadAmin Fazli, Sharif University of Technology
  Designed and graded coding assignments on working with files in C.
- **Physics Olympiad** (Teacher) — 2020–2022
  Allame Helli High school

Honors and Awards

- Selected as one of 41 students worldwide (< 3% acceptance rate) to participate in the **E3 (EPFL Excellence in Engineering)** internship program [Certificate] 2023
- **Silver medalist** at 4th European Physics Olympiad, Romania [Certificate] 2020
- **Sir Isaac Newton Award** (Among the top 200 participants) [Certificate] 2020
  Sir Isaac Newton Exam (SIN) is a test of high school physics and is offered by the Department of Physics & Astronomy at the University of Waterloo.
- **Gold medalist** at 31st Iranian Physics Olympiad [Certificate] 2019

Projects

- **Telegram Group Social Dynamics** (Related course: Network Science) [Repository and Results] Fall 2023
  Under the supervision of Prof. Saman Moghimi-Araghi, we studied the communication network among members of the course in the Telegram group. We collected data on interactions such as replies, emoji reactions, and pinned messages using Telegram's MTProto API and `telethon` *library. We saved the gathered data in a database for further analysis. We then analyzed the degree distribution of individuals interacting, revealing power-law behavior similar to other social networks. (Also revealed that the professor is the person most interacted with!)*
- **SVM Classifier for Satellite Imagery** (Related course: Machine Learning) [Repository] Fall 2023
  Under the supervision of Prof. Mahdi Jafari Siavoshani, I trained Support Vector Machines (SVMs) on the `satimage` *dataset using various kernel functions. Using the RBF kernel with a One-against-one approach, I achieved a test accuracy of 88.7%. I also combined six One-against-all models to create a multiclass classifier, reaching a test accuracy of 89.6%. My results are close to the 91.7% accuracy reported in Hsu and Lin's work,* A Comparison of Methods for Multiclass Support Vector Machines *(IEEE Transactions on Neural Networks).*
- **LPQM Automatic Qubit Calibrator** [Report] Summer 2023
  We developed an automatic qubit characterization system using Quantum Machines® controllers (OPX+ and Octave). Similar to [Google's approach] we implemented a calibration graph consisting of eight calibration nodes. *We use spectroscopy techniques to measure and analyze reflection data (S_{11}) from the superconducting qubits. We have also implemented a database and API for communication among these nodes. Automating the calibration process, formerly done with Vector Network Analyzers, lets us streamline measurements and allows lab researchers to analyze temporal shifts by continuously monitoring resonator frequencies, Qubit frequencies, T_1, and more.*
- **LPQM Switch Controller** [Repository] [Demo] (Not connected to the real fridge!) Summer 2023
  I developed a Python package and a web-based GUI for Radiall™ switches in the Bluefors fridge at LPQM lab, optimizing switching processes to minimize pulse length and reduce heat input during setup changes.
- **LPQM Autonomous Wafer Testing System** Summer 2023
  I configured an MPI TS2000-D probe station and a Keithley 4200A-SCS parameter analyzer for remote control. After I found a hardware issue with the prober's GPIB module, I replaced it with an external GPIB module and reconfigured the prober. This enabled successful communication and automated the wafer test procedure.
- **Percolation Models in Disease Dynamics** (Related course: Complex Systems) [Repository] Spring 2023
  Under the supervision of Prof. Shahin Rouhani, we analyzed disease spread using percolation models on weighted graphs, comparing outcomes with traditional SIR simulations.
- **Virial Theorem in Three-Body Systems** (Related course: Analytical Mechanics II) [Repository] Spring 2023
  Under Prof. Mahmud Bahmanabadi's guidance, we confirmed the Virial theorem validity in the three-body gravitational problem by numerically solving the differential equations and analyzing the system's stability over time.
- **Warp Plus** [Repository] Spring 2024–Current
  Cloudflare's network is one of the few connections linking Iran's restricted internet to the global web. To bypass the country's firewall, I set up a server and contributed to open-source tools to create a Warp tunnel. I also developed tools to monitor the tunnel's health and reroute traffic disguised as a fake website, connecting users to the free world.
- **Java Yu-Gi-Oh!** (Related course: Advanced Programming) [Repository] Spring 2021
  We made a graphical Java version of the card game, showing our skills in Java programming and game design.

Notable Courses

- **Machine Learning** (20.0/20) (top undergrad student)
  Prof. Mahdi Jafari Siavoshani
- **Computer Simulation** (20.0/20)
  Prof. Bardia Safaei
- **Numerical Computation** (20.0/20)
  Dr. Fatemeh Baharifard
- **Advanced Programming** (20.0/20)
  Prof. MohammadAmin Fazli
- **Biophysics** (20.0/20)
  Prof. Nader Reihani
- **Network Science** (20.0/20)
  Prof. Saman Moghimi Araghi
- **Complex Systems** (19.5/20)
  Prof. Shahin Rouhani
- **Engineering Probability & Statistics** (20.0/20)
  Prof. Ali Sharifi-Zarchi

Workshops & Certifications

- **Integrated Photonics for Next Generation Technologies (INGEN2023)** July 2023
  Saanen, Switzerland
- **Unlocking the Brain Will Shape Tomorrow's World** March 2023
  A workshop by Prof. Alireza Valizadeh on advancements in neuroscience. Tehran, Iran
- **Introduction to Quantum Technologies** [Certificate] March 2023
  Psiket School of Science and Technology, Tehran, Iran
- **Qubit by Qubit** [Certificate] September 2022–April 2023
  IBM Quantum, Online
- **Key Concepts in Blockchain Technology** [Certificate] Fall 2022
  IEEE Iran section
- **Hands on Particle Physics** [Certificate] March 2018
  The International Particle Physics Outreach Group (IPPOG)

Computer Skills

- **Tools and Frameworks:** `networkx`, `scikit-learn`, `pandas`, `scipy`, `numpy`, Docker, Git, Linux, LaTeX
- **Programming Languages:** Python, R, MATLAB, C/C++, SQL, Java, Go, Julia
- **Networking:** TCP/IP, DNS, firewalls, VPNs, routing & switching, Wireshark, DevOps

Languages

- **Persian:** Native
- **English:** Fluent
  [Iran Language Institute certificate]
  (TOEFL exam scheduled for November 2nd 2024)

References

Prof. Tobias J. Kippenberg
Full Professor, Laboratory of Photonics and Quantum Measurements (LPQM), EPFL
Email: tobias.kippenberg@epfl.ch

Dr. Marco Scigliuzzo
Postdoc Researcher, EPFL
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Dr. Samira Hossein Ghorban
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